

ALON AQUIFER EXEMPTION APPLICATION – LOWER SANTA MARGARITA FORMATION

Central Valley Water Board Staff Comments

- 1) The proposed aquifer exemption boundary (See Attachment G of the Application) to the southwest of the refinery extends nearly one mile beyond the administrative boundary of the Fruitvale oil field. The existing MUN de-designation for the Santa Margarita formation in the Tulare Lake Basin Plan extends only ¼ mile beyond the boundary of the Fruitvale oil field (See page II-7 of the Basin Plan). Therefore, in addition to obtaining an aquifer exemption from US EPA, Alon would need to obtain from the Regional Water Board (RB) a Basin Plan amendment that de-designates the MUN beneficial use within the proposed aquifer exemption area in portions of Sections 32 and 33, T29S, R27E, MDB&M and that is greater than ¼ mile from the boundary of the Fruitvale oil field.

We defer to the Water Board on this item; this should have no bearing on EPA's determination on the aquifer exemption request.

- 2) It is unclear what is meant by "lower Santa Margarita formation." Geophysical logs for Alon's injection wells WD-1, WD-2, and WD-3 show five sands in the upper Santa Margarita with the base of the lowermost sand marked on each log as the "E Sand." Is the base of the E Sand also the top of Alon's lower Santa Margarita formation? Alon needs to include a table with the depths and subsea elevations for the Etchegoin, Fairhaven, Mason-Parker, Martin, Upper Kernco, Middle Kernco, Lower Kernco, Santa Margarita, and Lower Santa Margarita in each Alon injection well and for those oil field injection wells within 1 mile of the Alon injection wells.

Yes, we agree. We raised a similar point in our initial review (see the General Project and Aquifer Information table of the completeness check, page 2, "Name of the aquifer or portion of the aquifer to be exempted").

- 3) Using the Division's Well Finder, RB Staff has determined that Class II oil field injection wells within ½ mile of Alon's injection wells are injecting produced water in the Etchegoin and Chanac sand zones above the Santa Margarita formation. For Fruitvale oil field, the Division of Oil, Gas, and Geothermal Resources (Division) 1973 Volume I indicates on the map, cross section, and data table that the Fairhaven Sand (in the basal Etchegoin formation) down to the base of the Lower Kernco (which is also the base of the Chanac formation) are hydrocarbon producing. The data table also indicates that only 75 feet of the 1,000 foot thick Santa Margarita formation was hydrocarbon producing in 1973. The Division may need to determine where this 75 foot interval is in the Santa Margarita formation, where within the Santa Margarita hydrocarbons have been produced both prior to and after 1973, and then decide how much of the Santa Margarita formation is currently exempted for injection disposal (perhaps down to the base of the E Sand?). Depending on the Division decision on the lateral and vertical limit of currently exempted Santa Margarita formation, Alon may need to include more of the Santa Margarita formation in the Application than just the currently proposed 'lower Santa Margarita' interval.

Yes, we agree. This point is related to the need to delineate the boundaries of the proposed exempted zone.

- 4) There is insufficient information to demonstrate lateral and vertical containment in Alon's 'lower Santa Margarita' interval. The geologic maps and cross section do not extend far enough downgradient to the south and southwest and more cross sections are needed across the

application area. The lateral extent of confining layer needs to be shown on cross sections. To demonstrate containment, Alon needs to submit information confirming the major mapped fault up structure from the refinery is actually present and that it is a sealing fault across the Santa Margarita formation. The confining zone described in the fifth paragraph in section 5.0 of the application is at or near the top of the Santa Margarita formation and at a depth of about 4,350 feet beneath ground surface; but the Application is for the lower Santa Margarita (below the E Sand?). Multiple confining zones from the basal Etchegoin to the Santa Margarita formation likely provide vertical containment to protect groundwater with beneficial uses above the Fairhaven Sand.

Yes, we agree. We raised a similar point in our initial review (see the table for 40 CFR 146.4(a), page 3, "Upper and lower confining zone(s) and description of vertical confinement from USDWs").

- 5) The groundwater sampling results submitted do not appear to be representative of true background groundwater chemistry in the Santa Margarita formation because phenols and MTBE (from refinery wastewater?) are detected. It is unclear at what measured depths and where in the Santa Margarita formation the reported samples were collected. Injection of refinery wastewater into the Santa Margarita occurred as early as 1981 or possibly even earlier. The oldest sample results reported in the Application appear to have been collected from Alon's WD-2 well in 1991. Older groundwater samples collected by Shell Oil Products or Big West of California from the Santa Margarita formation may be present in the RB files.

We agree that the depth/location of the water quality samples is unclear (see the general information table, page 2, "Information on the TDS content of the aquifer...") and that the source of the contamination is not specified (see the table for 40 CFR 146.4(b)(3), page 6, "Concentration, type, and source of contaminants"). It is recommended that this information be provided.

However, for purposes of EPA's evaluation of the aquifer exemption request, the aquifer exemption criterion at 40 CFR 146.4(b)(3) focuses on the current state of the aquifer and the economic and technical practicality of treating the water (as interpreted in Peter Grevatt's memo "Enhancing Coordination and Communication with States on Review and Approval of Aquifer Exemption Requests Under SDWA." As a result, data reflecting the true (original, pristine) background groundwater chemistry may not be necessary to support EPA's review.

If California needs information about background water quality that pre-dates all injection activity for other purposes, the request for additional information could include a specific request for pre-injection water quality data.

- 6) Not all active and abandoned water supply wells within the aquifer exemption area shown in Attachment G are identified in the Application (See Geotracker map view of CDPH wells).

We defer to the Water Board on this item.

- 7) The Division's Project Approval Letter (PAL) was revoked in March 2002 for Alon's Red Ribbon 7 injection well. The application indicates Alon wants to resume injection into Red Ribbon 7, but it does not make clear why the Division revoke the PAL?

We defer to the Water Board on this item.

- 8) Based on RB staff geophysical log correlations, the Red Ribbon 7 well may have injection perforations in the first Etchegoin sand above the hydrocarbon bearing Fairhaven Sand. Resumption of injection by Alon into this Etchegoin sand may not be appropriate (and could be why the PAL was revoked) because the several Etchegoin sands above the Fairhaven Sand do NOT appear to be in an exempted aquifer [See Comment # 3].

Yes, we agree. We raised a similar point in our initial review (see the general information table, page 2, "Depth and thickness of the aquifer").